

AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all prior versions and listings of the claims in the application.

1-14. (canceled)

15. (withdrawn) A method for removing undesirable flue gas components, said method comprising:

- (a) combusting coke comprising sponge coke in an amount in the range from about 40% to 100% by weight and having volatile combustible materials in an amount in the range from about 13% to about 50% by weight;
- (b) injecting conversion reagents into flue gas with sufficient mixing and sufficient residence time at sufficient temperature to convert undesirable flue gas components to collectible particulates upstream of a particulate control device (PCD); and
- (c) collecting said particulates in said particulate control device, said particulate control device including a PCD process selected from the group consisting of electrostatic precipitation (dry or wet), filtration, cyclones, and wet scrubbing.

16. (withdrawn) A method for removing undesirable flue gas components according to claim 15, further comprising:

recycling unreacted flue gas conversion reagents to increase reagent utilization, wherein the rate of recycling exceeds 5% by weight of collected flyash.

17. (withdrawn) A method for removing undesirable flue gas components according to claim 15, further comprising:

regenerating and reusing spent flue gas conversion reagents using a process selected from the group consisting of hydration, precipitation, and other unit operations;

wherein the rate of regeneration exceeds 70% by weight of collected flyash, and less than 30% of the collected flyash is disposed as a purge (or blowdown) stream, containing high concentration of impurities.

18. (withdrawn) A method for removing undesirable flue gas components according to claim 17, further comprising:

using the purge stream from the regeneration process as a resource for

valuable metals; and

extracting and purifying said valuable metals.

19. (currently amended) A process of producing coke, said process comprising the steps:

- (a) ~~Providing~~ Obtaining a coke precursor material derived from fossil carbonaceous origin; ~~and~~
- (b) Subjecting said coke precursor material to a thermal cracking process, said thermal cracking process performed for sufficient time and at sufficient temperature and under sufficient pressure so as to promote the production of porous sponge coke; ~~and and to produce a coke product having volatile combustible materials (VCMs) present in an amount in the range from about 13% to about 50% by weight;~~

~~wherein said coke is comprised of sponge coke in an amount in the range of about 40% to 100% by weight.~~

- (c) Adding at least one chemical compound of predetermined quality and predetermined quantity to said porous sponge coke in a coke quenching portion of said thermal cracking process;

Whereby said at least one chemical compound substantially improves the combustion characteristics, ash characteristics, or environmental impacts of said coke when used in a combustion process.

20. (currently amended) A process according to claim 19 wherein said coke precursor

material is derived from crude oil, coal, shale oil, or tar sands.

21. (currently amended) A process according to claim 19 wherein said VCMs are present in an amount in the range of from about ~~45~~13% to about ~~30~~50% by weight.

22. (currently amended) A process according to claim 21~~49~~ wherein said VCMs are present in an amount in the range of from about 15% to about 30% by weight. ~~coke has sufficient porosity and sufficient physical and chemical properties to provide low to medium grades of adsorption quality carbon.~~

23. (currently amended) A process according to claim 19~~22~~ further comprising introducing at least one chemical compound into said thermal cracking process to improve the adsorption characteristics of said coke product.

24. (original) A process according to claim 23 wherein said at least one chemical compound is selected from the group consisting of hydrogen, plastics, wood wastes, coals, and non-volatile hydrocarbons with appropriate cracking/coking characteristics.

25. (currently amended) A process according to claim ~~22~~19 wherein adding at least one chemical compound ~~coke adsorption characteristics are~~is used for further coke treatment, said coke treatment including the removal of at least one undesirable chemical compound, said coke treatment comprising the steps:

- (a) Selective addition of at least one chemical reactant in a fluid that passes through said coke; and
- (b) Maintaining sufficient temperature, sufficient pressure, and sufficient residence time to cause a reaction of desired degree.

26. (currently amended) A process according to claim 25 wherein said at least one

undesirable chemical compound ~~contains~~ sulfur, nitrogen, or a metal.

27. (original) A process according to claim 25 wherein said fluid is a coke quench medium.

28. (original) A process according to claim 25 further comprising calcining said coke to remove excessive VCMs and alter crystalline structure to low porosity coke with sufficient density such that said coke is adapted to be used for steel or aluminum manufacture.

29. (currently amended) A process according to claim ~~22-19~~ wherein coke adsorption characteristics are used for further coke treatment, said coke treatment including the addition of said at least one ~~desirable~~ chemical compound in a fluid that passes through said coke, said at least one desirable chemical compound selected from the group consisting of ~~VCMs~~hydrocarbons, chemical adsorbents, and oxygen-containing compounds.

30. (original) A process according to claim 29 wherein said fluid is a coke quench medium.

31. (currently amended) A process according to claim 29 wherein said chemical adsorbents are ~~SOx~~sulfur sorbents.

32. (canceled)

33. (currently amended) A process according to claim ~~32~~27 wherein said at least one plastic is added to said thermal cracking process in a feed recycle stream downstream of a fractionator.

34. (withdrawn) A coke product made in accordance with a process according to claim

19.

35. (withdrawn) A coke product according to claim 34 wherein said coke product is adapted for use as an adsorption media.

36. (withdrawn) A coke product according to claim 35 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

37. (withdrawn) A coke product according to claim 34 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

38. (withdrawn) A coke product according to claim 37 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

39. (withdrawn) A coke product according to claim 34 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

40. (withdrawn) A coke product made in accordance with a process according to claim 22.

41. (withdrawn) A coke product according to claim 40 wherein said coke product is adapted for use as an adsorption media.

42. (withdrawn) A coke product according to claim 41 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

43. (withdrawn) A coke product according to claim 40 wherein said coke product is

adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

44. (withdrawn) A coke product according to claim 43 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

45. (withdrawn) A coke product according to claim 40 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

46. (withdrawn) A coke product made in accordance with a process according to claim 23.

47. (withdrawn) A coke product according to claim 46 wherein said coke product is adapted for use as an adsorption media.

48. (withdrawn) A coke product according to claim 47 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

49. (withdrawn) A coke product according to claim 46 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

50. (withdrawn) A coke product according to claim 49 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

51. (withdrawn) A coke product according to claim 46 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.
52. (withdrawn) A coke product made in accordance with a process according to claim 25.
53. (withdrawn) A coke product according to claim 52 wherein said coke product is adapted for use as an adsorption media.
54. (withdrawn) A coke product according to claim 53 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.
55. (withdrawn) A coke product according to claim 52 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.
56. (withdrawn) A coke product according to claim 55 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.
57. (withdrawn) A coke product according to claim 52 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.
58. (withdrawn) A coke product according to claim 52 wherein the sulfur content of said coke product is sufficiently reduced to enable said coke product to be used for steel or aluminum manufacture.

59. (withdrawn) A coke product made in accordance with a process according to claim 29.
60. (withdrawn) A coke product according to claim 59 wherein said coke product is adapted for use as an adsorption media.
61. (withdrawn) A coke product according to claim 60 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.
62. (withdrawn) A coke product according to claim 59 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.
63. (withdrawn) A coke product according to claim 62 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.
64. (withdrawn) A coke product according to claim 59 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.
65. (withdrawn) A coke product according to claim 59 wherein the sulfur content of said coke product is sufficiently reduced to enable said coke product to be used for steel or aluminum manufacture.
66. (withdrawn) A coke product made in accordance with a process according to claim 32.
67. (withdrawn) A coke product according to claim 66 wherein said coke product is

adapted for use as an adsorption media.

68. (withdrawn) A coke product according to claim 67 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

69. (withdrawn) A coke product according to claim 66 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

70. (withdrawn) A coke product according to claim 69 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

71. (withdrawn) A coke product according to claim 66 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

72. (withdrawn) A coke product according to claim 66 wherein the sulfur content of said coke product is sufficiently reduced to enable said coke product to be used for steel or aluminum manufacture.

73. (withdrawn) A method for producing energy, said method comprising combusting a fuel, said fuel comprising coke, said coke comprising sponge coke in an amount in the range from about 40% to 100% by weight and volatile combustible materials (VCMs) in an amount in the range from about 13% to about 50% by weight.

74. (withdrawn) A method according to claim 73 wherein said VCMs are present in an amount in the range of from about 15% to about 30% by weight.

75. (withdrawn) A method for producing energy according to claim 73 wherein said fuel comprises a mixture of said coke and at least one other fuel, and wherein the heat release ratio of said coke to said at least one other fuel in said mixture is greater than about 1:4.

76. (withdrawn) A method according to claim 75 wherein said at least one other fuel is coal, fuel oil, natural gas, by-products, or wastes.

77. (new) A process of producing coke, said process comprising the steps:

- (a) Obtaining a coke precursor material derived from carbonaceous origin;
- (b) Subjecting said coke precursor material to a thermal cracking process, said thermal cracking process performed for sufficient time and at sufficient temperature and under sufficient pressure so as to promote the production of coke; and
- (c) Adding at least one plastic to said thermal cracking process at a point with sufficient temperature to fluidize said at least one plastic and sufficient residence time to mix with said coke precursor material to achieve desired cracking temperature prior to a reaction chamber used in said thermal cracking process.

78. (new) A process according to claim 77 wherein said at least one plastic is added to said coke precursor material downstream of a heater used in said thermal cracking process.

79. (new) A process according to claim 77 wherein said plastics are selected from the group consisting of high density polyethylene, low density polyethylene, polypropylene,

polystyrene, polyvinyl chloride, polyvinyl acetate, polyacrylonitrile, polyurethane, acrylonitrile butadiene styrene (ABS), and other copolymers, plastics, and chemicals having suitable characteristics.

80. (new) A process according to claim 77 wherein said plastics are added without segregation of types of said plastics.

81. (new) A coke made in accordance with a process according to claim 19.

82. (new) A process according to claim 31 wherein said sulfur sorbent is selected from the group consisting of hydrated lime, limestone, hydrated dolomitic lime, calcium compounds, magnesium compounds, sodium compounds, potassium compounds, alkali metal compounds, alkaline earth compounds, and any combination thereof.